

**REMARKS**

This is in response to the non-final Official Action currently outstanding with regard to the present application.

Claims 1-39 were pending in this application at the time of the issuance of the currently outstanding Official Action. By the foregoing Amendment, Applicants have canceled Claims 1-39, without prejudice, and have added new Claims 40-70. No Claims have been amended or withdrawn. Accordingly, upon the entry to the foregoing Amendment, Claims 40-70 as hereinabove presented will constitute the Claims under active prosecution in this application.

The claims of this application are reproduced above including appropriate status identifiers as required by the Rules.

More particularly, in the currently outstanding Official Action the Examiner has:

1. Acknowledged Applicants' claim for foreign priority under 35 USC §119 (a)-(d) or (f), and confirmed the receipt of the required copies of the priority documents by the United States Patent and Trademark Office;
2. Indicated the drawings filed as part of this application on 9 December 2003 (apparently logged in by the United States Patent and Trademark Office on 11 December 2003) are accepted;
3. Acknowledged his consideration of the Information Disclosure Statement filed in this application by providing the Applicants with a copy of the Form PTO-1449 that accompanied that Statement duly signed, dated and initialed to confirm the consideration of the art listed therein;

4. Rejected Claim 1 under 35 USC §102(b) as being anticipated by Shultz (US Patent No. 3,167,129);
5. Rejected Claims 1, 3, 8-9, 14, 16-25, 36-39 under 35 USC §103(a) as being unpatentable over Richard (US Patent No. 6,824,094) in view of Arlton et al (US Patent No. 5,879,131);  
and
6. Rejected Claims 2, 4-7, and 10-12 under 35 USC §103(a) as being unpatentable over Ricard in view of Arlton as applied to claim 1, and further in view of Michelson (US Patent No. 6,082,671).

No further comment regarding items 1- 3 above is deemed to be required in these Remarks.

With respect to items 4-6 above, Applicants have canceled Claims 1-39, without prejudice, and have substituted Claims 40-70 therefore. Claims 40 and 42 are entirely new and Claims 43-70 correspond to previous Claims 2-30 with minor revisions for clarity and to change their respective dependency relationships so as to be directly or indirectly dependent upon new independent Claims 40. Applicants respectfully submit that new Claims 40 and 41 are supported by the specification as originally filed generally, and in particular at Figs. 16 and 45-47 as well as at page 2, final paragraph to page 3, last full paragraph; at the description of the third embodiment of the invention commencing at page 75, line 5; and at the final paragraph of page 42.

In the above regards, Applicants respectfully submit that the present invention as clarified in New Claims 40 and 41 is neither disclosed by any of the references currently of record in this application, nor obvious in view of any combination thereof. Accordingly, entry of the foregoing Amendment and allowance of this application with Claims 40-70 as hereinabove presented in response to this communication is respectfully requested.

More particularly, the flapping apparatus recited in new Claim 40 above is characterized in that a driving unit pivots a leading edge of a wing portion in a forward and backward direction and reverses the angle of attack of said wing portion so as to generate rotational lift and wake capture during the pivoting operation as described in the present specification with regard to the third embodiment of the present invention. In this regard, the Examiner's attention is respectfully directed to pages 2 and 3 of the present specification whereat the concepts of rotational lift and wake capture are explained in detail.

Further, the flapping apparatus of the present invention is characterized in that the leading edge of the wing portion has a greater rigidity than the remainder of the wing portion, and in that the angle of attack of the wing portion is smaller by virtue of its elastic deformation than the comparable angle of attack of a similarly controlled rigid wing portion.

According to the above characteristics, the flapping apparatus as claimed hereinabove can hover stably in comparison to another flying object such as a helicopter. This becomes readily apparent once it is understood that, for example, a dragonfly, that flaps its wings in a manner similar to the manner in which the present invention flaps its wing portion, can hover stably in the air.

Applicants respectfully submit that neither the Shultz reference, nor the Richard reference, nor the Arlton reference discloses a flapping apparatus comparable to that hereinabove claimed. Instead, each of those references discloses a helicopter or an ornithopter. As an analysis of the foregoing references clearly indicates, neither a helicopter nor an ornithopter operates by reciprocating a wing in a forward and backward direction utilizing a control unit that pivots a driving unit about a rotational axis such that during the pivoting of the drive unit a leading edge of the wing portion reciprocates in a forward and backward direction, and an angle of attack of the wing portion is reversed so as to generate rotational lift and wake capture. Instead, a helicopter and an ornithopter both operate by rotating (rather than pivoting in the manner herein claimed) a wing about a rotational axis above or beside a body without movement of the unit that drives the wing portion relative to the body.

Thus, for example, the Richard reference cited by the Examiner discloses two pairs of wings, one adjacent to top of his body and the other adjacent to the bottom of his body, wherein the respective sets of wings are offset relative to one another by 90°. The wings of each pair are driven so as to flap up and down vertically relative to the body via linkage members driven by a drive means that does not move relative to the body. That up and down flapping movement is said by Richards to provide lift to the device and in addition in combination with the airfoil configuration of the respective wings to cause the wing assemblies to rotate about respective common hub mounting points located on the vertical axis of the body in a manner similar to that of a helicopter. In this regard, it is to be noted that the rotation of the wing assemblies in the Richard reference is not driven by the driving means, but rather is a function of the interaction of the airfoil configuration of the wings with the surrounding fluid. The result is that the wing tips describe one or more essentially sinusoidal paths above the body as they rotate about their respective hubs located on the longitudinal axis of the body. Hence, the vertical flapping of the Richards wings indirectly imparts rotation to the wing assemblies, lift to the body, axial tilt compensation as is required in all helicopter applications and permissibly, lateral motion to the body in cases wherein the flight controls provide an appropriate configuration to the airfoil shape of the wings. However, this manner of driving the wing portions of the Richard device is clearly distinct from, and would not suggest to one skilled in the art, the manner of driving the wing portion hereinabove claimed.

Hence, Applicants respectfully submit that the devices disclosed in the Shultz, Richard and Arlton references currently cited by the Examiner are clearly different from, and thus inapposite to, the present invention as recited in new Claim 40 presented hereinabove with respect to at least the manner in which the wing portions of those devices are moved.

In addition, Applicants respectfully submit that the Michelson reference relied upon by the Examiner does not disclose a flapping apparatus that pivots a wing portion in a forward and backward direction by the utilization of a control unit that pivots a driving unit about a rotational axis to achieve its goals. Instead, the Michelson reference discloses a flapping apparatus that relies upon the pivoting of a wing portion in an upward and downward direction relative to a main body portion. In this regard, it is to be noted that the flapping apparatus recited in new Claim 40 hereinabove generates a lifting force allowing it to hover in the air by the utilization of rotational lift, wake capture and elastic deformation of the wing portion. Michelson, on the other hand, generates a lifting force by the reciprocation of a wing portion in a direction perpendicular to a main surface thereof. Therefore, Applicants respectfully submit that the Michelson reference also is clearly different from, and thus inapposite to, the present invention as recited in new Claim 40 presented hereinabove with respect to at least the manner in which the wing portions thereof are moved.

Further, with respect to the Examiner's comments concerning an alleged disclosure of a wave plate structure associated with the top and/or forward edges of wing portions in the Michelson reference, Applicants respectfully submit that the Examiner's reliance upon the Michelson reference is misplaced.

The Michelson reference discloses air-containing passageways located in a fan-like pattern extending outwardly from the main body of the device disclosed therein as the supporting spars for the material of the wings. Applicants respectfully submit that that construction is not sufficient to teach, disclose or suggest “elastic” wings (even in the case in which the passageways are filled with air to the point of being substantially rigid) because the material between the passageways (spars) simply is not elastic in nature. Further, Applicants respectfully submit that the Michelson reference is not sufficient to teach, disclose or suggest the wave plate structure herein claimed as defining alternate ridges and valleys along the wings (or the forward edges of the wings) because Michelson simply does not show the claimed structure.

Instead, the air-filled spars of Michelson may be located entirely within the wing (i.e., between its upper and lower surfaces). Further, even in those embodiments wherein this is not the case, it is clearly shown in Michelson’s Fig. 1 that the air-filled passageways (spars) radiate outwardly from the body in a fan-like array toward the peripheral edge of the wing. Further, the passageways are not regularly spaced relative to one another, and indeed some of the passageways break into multiple sub-passageways as they extend from the body toward the wing periphery. Still further, the Michelson reference is quite clear in its statement that the air pressure maintained in the various passageways is variable according to the stiffness to be imparted to the wing (a feature that would detrimentally impact the benefit of the presently claimed waveplate surface structure of the forward edge and/or top of the wings).

As a result, Applicants respectfully submit that the Michelson reference clearly is insufficient as a teaching, disclosure or suggestion of the claimed waveplate structure that extends laterally of the wings and/or the forward edges thereof (i.e., parallel to the longitudinal axis of the body).

For each and all of the foregoing reasons, entry of the foregoing Amendment, reconsideration and allowance of all of the claims present in this application after the entry of the foregoing Amendment are respectfully requested in response to this communication.

Applicant also believes that additional fees beyond those submitted herewith are not required in connection with the consideration of this response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. 04-1105, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

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